

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Lars Hammer
Student number	4024834
Telephone number	
Private e-mail address	

Studio	
Name / Theme	Hyperbody / Design to Robotic Production and Smart Student Housing
Teachers / tutors	Dr. Henriette Bier & Dr. Nimish Bioria
Argumentation of choice of the studio	I wanted to learn more about parametric design, smart architecture and its applications. I think these topics will be more and more relevant the future and I consider it a great asset to master the skills in Computer Aided Parametric Design.

Graduation project	
Title of the graduation project	Hong Kong Hub <i>A modern solution to modern problems in High Density Cities.</i>
Goal	
Location:	Hong Kong
The posed problem, research questions and design assignment in which these result.	Problem Statement – <i>Explained Below</i> Research Question – <i>Explained Below</i> Design Assignment – <i>Explained Below</i>
<i>The Problem Statement</i>	
<p>The project is set in the City of Hong Kong. An city which has an interesting social and governmental structure, but it is also the city which recorded one of the highest living densities in the world. This has come with many challenges for the city as for its inhabitants. Three main issues came forward in the research about the city; the low amount of daylight entering the residential buildings, an extremely high noise-pollution and air-pollution caused by street traffic and a low availability of places for leisure or social activities. Since these problems occur a lot in cities in other emerging economies, it is important to discuss and research possibilities to solve these problems.</p>	

The posed problem in this graduation project is *thus the unsustainable design of the current city of Hong Kong and it's result of low quality living.*

Research Questions

In order to solve these challenges or issues, a main-research question is constructed, together with a few sub-research questions which are necessary to come to a complete and good research result.

The main Research Question;

How to design a Residential/Commercial Building which addresses the challenges of Noise Pollution, lack of sufficient Daylight and an absence of quality public space.

The Sub-Research Questions;

- 1. What are current solutions to low daylighting in high density cities?*
- 2. What are current solution to noise pollution in high density cities?*
- 3. What are current solutions to increase the social activities within a building?*
- 4. How is it possible to make a more integral functional program which promotes social activities.*
- 5. What kind of computational strategies need to be implemented to come to a good solution.*
- 6. How to test the generated solutions?*

Design Assignment in which these result

The goal of this graduation is using complex simulations which determine the overall configurations of a building. The simulations are made to give insight into specific elements, like daylight-design, noise pollution and more social elements of its inhabitants. The context is a plot in the city center of Hong Kong. On this plot a building currently stands which is the example of the specific problems encountered within the research. The design assignment will be designing an replacement to this building which deals with the specific problems in a good manner, but still is able to inhibit the different important functions.

Final Design

The envisioned final design will be a configuration of volumes with different functions. This configuration is determined on several external parameters, like sound, daylight and distances etc. The building will inhibit commercial spaces on the first four floors which configurations will be decided on the walk-routes around the building as well as noise controlling configurations, upwards from the fourth floor commercial/residential spaces will be found, which configuration is based on the needed daylight per function. A 'shopping-street' will lead the people upwards and bring the shops/work closer to the inhabitants, while simultaneously promote social activities within the building. On the top floors will be place for leisure activities and a restaurant as an extra incentive for people to enter this building.

Process

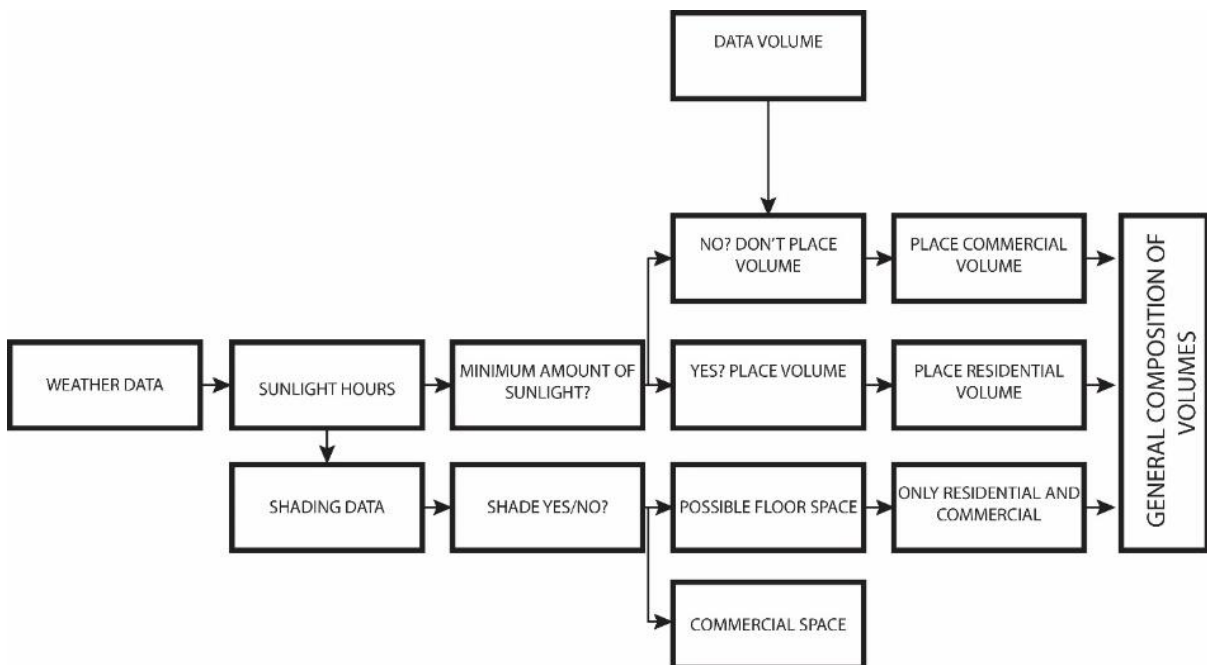
Method description

Method of Design

The methodology of the project can be divided into three different phases. The first one is the literature/context research to get a grasp of the current situation and challenges. The second phase is a computational strategies in which the literature/context research will be applied to realize different kinds of configurations/concepts of the building. These will different configurations/concepts will then be evaluated on criteria set by the research. The third and last phase is using the evaluated configurations for a final design, and tweaking to confirm to the program of requirements.

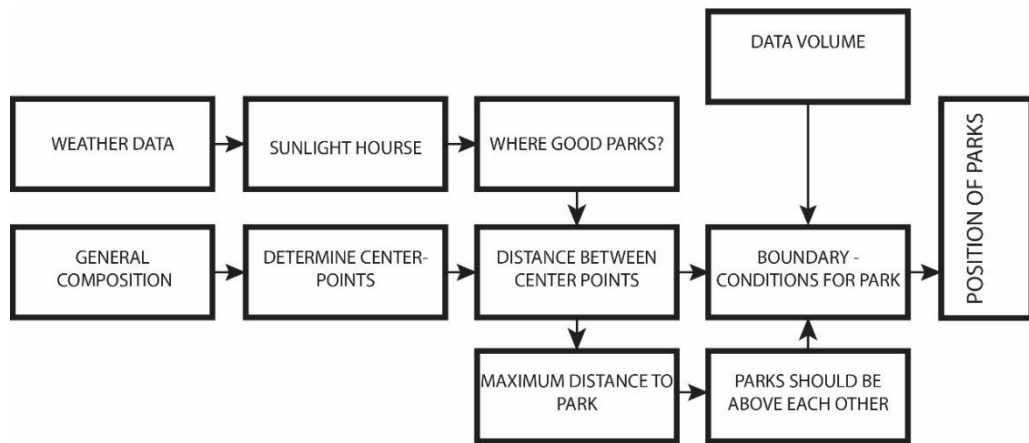
Computational Strategies

Daylight



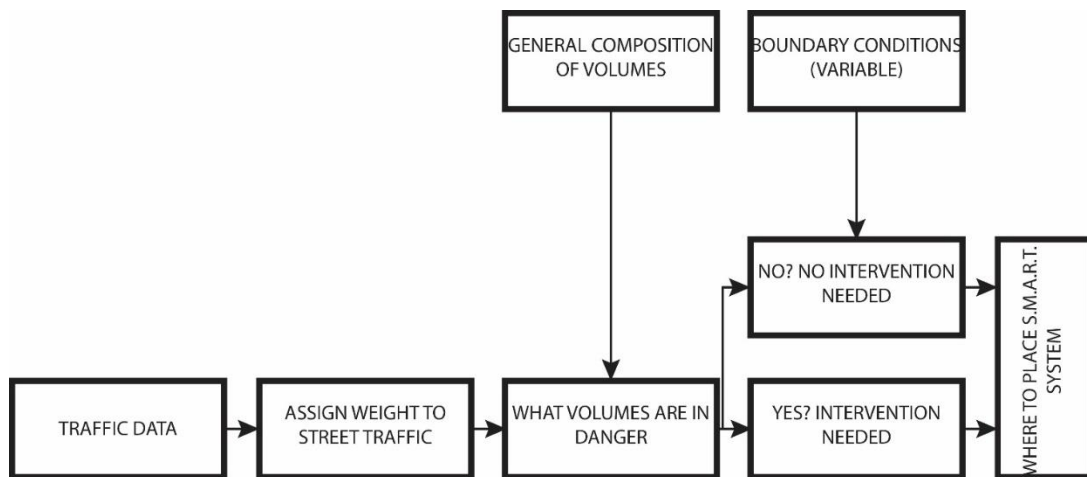
1. We will have weather data, which provides us with shading as well as sunlight hours.
2. To which we can determine what the minimum sunlight hours are we want. The shading will be a more direct way to determine a location for certain volumes. (shading = only public space and commercial space, no shading = a combination of three)
3. At the no shaded spaces we will apply a minimum amount of floor-space as volumes (which can be variable).
4. Where the volumes which need the most daylight hours versus the volumes which needs the least are configured like that.
5. Resulting in a building configuration.

Noise



1. For this solutions we will need Traffic Data as a source, to determine how crowded it is on which parts around the building plot
2. These are used to determine the strength of the sound source on the streets and relate them to a specific period of the day.
3. Specific points will be chosen which emit these decibels at the specific times. And with the previous generated configurations of the building it can be determined which will be in danger of sound pollution.
4. This way we can determine where an intervention is needed, as well as the shape of the intervention

Public Spaces



1. The weather data will provide us with sunlight hours, important for the vegetation in the public parks. The configuration on which this will be applied is the result of our first simulation.
2. The distance to the volumes will be determined from each CenterPoint and thus a volume of a certain size has to encompass at least X amount of residential space area.
3. The parks should be at least placed above each other and be crossed by the traffic shaft.

Literature and general practical preference

Literature:

Designing High Density Cities – for social and environmental sustainability
by Edward Ng.

Designing for Daylighting
by Edward NG

Designing with Space Syntax
by Pirouz Nourian

Interactive Architectural Approach, An effective and adaptive process for architectural design
by Mojtaba Parsaee

The Role of Urban Greenery in High-Density Cities
by Nyuk-Hien Wong and Yu Chen

Sound Environment: High- versus Low-Density Cities
by Jian Kang

Links

<http://blog.euromonitor.com/2015/09/top-5-emerging-markets-with-the-best-middle-class-potential.html>

https://en.wikipedia.org/wiki/Metro_Manila

<https://www.youtube.com/watch?v=WB2-2j9e4co>

<http://www.dailymail.co.uk/news/article-2282764/Hong-Kongs-human-battery-hens-Claustrophobic-images-slum-families-squeeze-lives-tiniest-apartments.html>

<https://de.wikipedia.org/wiki/2000-Watt-Gesellschaft>

https://nl.wikipedia.org/wiki/Kowloon_Walled_City

https://en.wikipedia.org/wiki/Building_automation

<http://www.designboom.com/technology/tangible-media-group-kinetic-blocks-10-13-2015/>

<http://www.designboom.com/technology/ori-robotic-furniture-fuseproject-yves-behar-mit-07-11-2016/>

<https://www.youtube.com/watch?v=xQywzdZAmPg>

Reflection

Relevance

Societal Relevance

The Hub-design will be of societal relevance due to its potential to solve a few specific social issues within the Hong Kong Context. The well-being and quality of life of the inhabitants has a central focus point within this project. With successful research conclusions, these can be a framework for future buildings in these specific societies.

Scientific Relevance

Next to the larger social framework the graduation project will provide an solution to a problem very known to current world-cities, which are the environmental challenges related to high density architecture. Implementing this specific design-direction to deal with challenges mentioned, makes it possible to explore the topic in a specific context and could form the basis for future research of designing with daylight and noise pollution in mind.

Projected Innovation

The projected innovation is a building which bypasses the traditional local architecture, but still fits within its context. The building could be an hallmark project for daylight design as well as an unconventional solution to these typical challenges of the high density city.

Time planning

Below is the expected time planning together with corresponding topics and presentations.

